

FITZ. (R. H.) *General pathology*

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REPORT ON PATHOLOGY AND PATHOLOGICAL ANATOMY.

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GENERAL PATHOLOGY.

Diagnosis of Cancer.—Neftel publishes a paper (*Brown-Séguard's Archives*, February, 1873) wherein he agrees with many other observers in regarding malignant tumors as primarily local. He seems rather absolute in stating that primary cancer of the lungs and kidneys never occurs. The main purport of his paper is to show that the urine in cases of cancer of the liver contains large amounts of indican, the presence of which "in large quantities, in persons affected with malignant tumors, I consider as pathognomonic of carcinoma of the liver."

He supports this view by a summary of three cases, in two of which the diagnosis was confirmed by the autopsy; the third case was one of recurrent cancer of the breast.

In 1863, Hoppe-Seyler (*Virch. Arch.*, vol. 27, p. 388) ascertained the presence of a large amount of indican in a case of melanotic cancer of the orbit, and it occurred to him that it was not improbable that the dark color of the urine observed by Eiselt in 1858, regarded as pathognomonic of melanotic cancer, might be due to the increased amount of indican. A more critical examination satisfied him that such was not the case. The dark color was present in other specimens of urine from cases of melanotic cancer, and the possibility of a connection between this and the disease was not denied; at the same time, the dark color is not indican.

Jaffe (*Centrbl.*, 1872, Nos. 31 and 32) finds indican increased in all diseases accompanied by intestinal obstruction, purulent peritonitis, certain forms of diarrhoea, and in various diseases where the latter existed as a symptom.

Rosenstirn (*Virch. Arch.*, vol. 56, p. 27) finds indican increased eleven to twelve times the normal amount in Addison's disease, numerous quantitative analyses having been made. With such evidence, it must be difficult to make the increased presence of indican in the urine pathognomonic of any one disease.

Infection.—The matter of infection and infectious diseases still remains prominent in the minds of many investigators. Continued attempts to solve this problem by way of experiment are presented, though the results of these experiments are insufficient to decide the question. Facts are furnished, however, which will make the pathway more clear for those who follow.

The point has often been raised that in the blood of healthy persons spores are found, hence their presence in the blood of diseased individuals cannot be so very remarkable.

Klebs, at the August meeting of the German Naturalists, 1872, gave the results of some investigations with reference to this matter (*Allg. Med. Cent. Zeit.*, Dec. 18, 1872). Glass tubes, closed at one end, were exposed for hours to a high temperature, the open end then fused. They were next introduced into the heart of living animals, one end

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broken off, and blood allowed to enter. Were the animals healthy, the blood formed a dark-red, opaque, crystalline pap, which remained unaltered for six months. The blood of animals into whom microsporin septicum had been injected also crystallized. When exposed to a temperature of 89.6° F., it liquefied, and was found to contain spores, single or united into masses. The report states, also, that "the distribution of the microsporin in sepsis, variola, and rinderpest, presents such characteristic differences that a specific distinction of them must be accepted."

Reiss (*Reichert u. Du Bois-Reymond's Arch.*, 1872; *Centrbl.*, 1872, No. 55) examines the blood of living persons in case of disease. In scarlatina, minute round bodies are seen, strongly refracting light, in part isolated, in part joined together in chains, again lying in large groups and masses. Their nature is considered infectious, because inoculation of such blood produces the death of rabbits, in whose blood similar bodies were afterwards found. As will be seen later, the results of such experiments can hardly justify the conclusions. Other bodies were found in the blood of scarlatina and other exanthemata, typhoid, acute rheumatism, puerperal fever, pneumonia, &c., similar, as Reiss thinks, to those observed by Max Schultze, Hüter and Hallier. He finds them in greatest numbers during the retrogression of the disease; the more numerous, the greater the general anæmia and exhaustion. They were also found in various chronic diseases, accompanied with anæmia or cachexia. He regards them as derived from the retrograde metamorphosis of white blood corpuscles. Inoculation with blood containing them gave negative results.

Vogt (*Centrbl.*, 1872, No. 44) examined the fluids from joints, where metastatic inflammations had occurred, with reference to the presence of spores. The joint of the living person being punctured, and the fluid observed, innumerable monads, possessing lively vital movements, were found. The corresponding uninflamed joint, and the blood in general, contained but few of these. He could not find the rod-like bacteria seen by Klebs under similar circumstances, and is inclined to regard this observation as the result of faulty method. The patient having died, the moving monads could not be found after a lapse of twenty-four hours. Rabbits were inoculated with the fluid from the diseased joint; death occurred in eight days, and in the pus taken from the point of inoculation, also in the muscular fibrils, numerous monads were seen. Inoculation of the fluid from the healthy joint produced no result.

There being little or no opposition to the fact that the inoculation of certain fluids produces infection, and it being also granted that such fluids contain spores, it becomes desirable to ascertain whether the presence of spores in infectious fluids is essential. Zülzer, at a meeting of the Berlin Medical Society, November, 1872 (*Allg. Med. Centr. Zeit.*, 1873, No. 7), after repeatedly filtering vaccine lymph, was finally able to obtain a fluid almost entirely free from bacteria. Attempting to vaccinate with this, he found that its activity was lost.

Wolff (*Centrbl.*, 1873, pp. 114 and 130) could not entirely free a fluid from germs, either by filtering, freezing, or other methods. At the same time, he ascertained that putrid blood acts wholly different from its filtrate, even when bacteria are added to the latter. His inference is, that the active principle of the putrid blood must be some

other morphological or chemical constituent than bacteria. The filtrate, in addition to relatively few bacteria, contained scarcely any odorous principle or sulphuretted hydrogen. He attempted to produce infection by the introduction of fluids containing bacteria and micrococci into the lungs. Twenty experiments were made, in eight of which disease of the lungs was found, apparently small broncho-pneumonic nodules, rarely lobular pneumonia, in the products of which large accumulations of micrococci were not found. Similar appearances were observed in animals who died from other causes, where the introduction of fungi could not be proven. Putrid alterations of the lungs, diphtheritis, miliary abscesses, containing colonies of bacteria, could not be produced by the introduction of fluids containing large amounts of fungi.

In the three other cases, where the bronchial mucous membrane was irritated previous to the introduction of the fungi, no alterations were found.

In some of the animals, an excretion of the fungi, by means of the kidneys, could be proven, though metastatic nodules could not be found in these or in other organs. In the lungs of the animals who died within six days, fungi were found to a slight extent; the lungs of those who lived six weeks contained either none at all, or very few.

In cases of infectious disease, it is well known that the lymphatic apparatus reacts more or less strongly. This is especially true of the spleen; in fact, the acute splenic tumor has been regarded as almost pathognomonic of infectious processes.

Birch-Hirschfeld (*Arch. d. Heilkunde*, 1872, p. 389) gives, as the results of experiments, that when moderate amounts of fluids containing micrococci are injected into the blood, the white blood corpuscles take them up in large numbers. After a while, probably depending on the amount injected, a progressive increase of the free cocci takes place until death occurs. In the pulp cells of the spleen, a part of the micrococci are retained, and when a large number are present, a distinct swelling of the organ occurs. If putrid fluids are injected into the serous cavities, a local inflammation results, and the animal may die before the micrococci enter the blood in large amounts; in such cases no splenic tumor is found. He has observed that in the septicæmic forms of puerperal fever, the appearances are similar to those occurring in animals in whose blood putrid fluids have been injected. Hence, where the patient dies with a splenic tumor, the infectious material must enter the circulation early; while, in the other series, the infection advances rather by way of the lymphatics, though both forms may occur.

A very interesting series of experiments have been made by Greveler and Hüter (*Centrbl.*, 1872, No. 49, and 1873, No. 5). Fluids containing monads having been injected into frogs, the mesentery, web, tongue and lungs were so prepared and placed under the microscope that the circulation could be observed. Many monads were found free in the blood, and bodies presenting the micro-chemical reaction of monads were found in the white blood corpuscles, especially in those which adhered to the walls of the vessels. Adhesion is also observed when the mesentery is prepared in the manner of Cohnheim, without previous inoculation; such occurs only after an interval of several hours. In Hüter's experiments the change was immediately observed—

within four hours after the inoculation. In the course of twenty-four hours, the adhering blood corpuscles were so numerous that nearly one-half of the capillaries had become obstructed, were cut off from the presence of circulating blood. In some instances, the monads were found clinging to the wall, producing similar effects to those caused by the white blood corpuscles. The circulation elsewhere became delayed and incomplete; capillaries, small veins and arteries were thus affected. Hüter regards the presence of monads in the white blood corpuscles as the cause for their adhesion.

Muscular Fibre in Inflammation.—The appearances of muscle as affected by traumatic inflammation, were observed by Gussenbauer (*Arch. f. Klin. Chir.*, 1872, xiii. ; *Centrbl.*, 1872, p. 779). Soon after the injury, a coagulation and frequent granular opacity of the contractile substance occurs. After twenty-four hours, numerous migratory corpuscles are found in the muscular interstices; also, vigorous proliferation of the muscular nuclei, especially in those parts which are coarsely granular. These enter the granular muscular substance, force the same apart, even separating real muscle-cells. These latter form spindle-shaped fibres with transverse striæ. The fibres at the two ends of the gap then grow towards one another. Hence, the regeneration of the muscular fibres proper proceeds from the original fibres, the granular degeneration of which in no way indicates destruction. From the migratory elements, and those produced from the perimysium, cicatricial tissue results, which fills up the wound, gradually diminishing in extent, never disappearing.

Fever.—At the close of Hüter's paper, referred to under the head of infection, the theory of a mechanical origin for fever is also advocated. Traube and Senator have already brought forward the views that the essence of fever is rather a diminished radiation than an increased production of heat. Traube supposes that the small arteries are contracted. Hüter sees that one-half the vessels, where observed, are cut off from circulating blood. This would account for an increased retention of heat. The chill and sudden elevation of temperature result from the sudden obstruction. The increased pulse may be due to the heat of the blood (Senator); perhaps, also, to increased opposition in the peripheral vessels. Death may be explained by the insufficiency of the heart, or by the obliteration of numerous vessels of the nervous centres of respiration and circulation, or through both causes. The fever would not necessarily demand a pre-existing chemical blood-poisoning (Weber, Billroth). The theory is regarded as explaining metastatic inflammation in the simplest manner; in addition to the diminished radiation, however, increased production may take place.

Senator (*Centrbl.*, 1873, No. 5) endeavors to determine the condition of the vessels during the hot stage of fever, whether it be dilatation, permanent or periodical contraction. The ear of white rabbits was made use of. A pyrogenous material, sputum with glycerine, in which are but few if any micrococci, was injected. There followed remitting increase of temperature, with but slight disturbance of the general condition. Some time after the injection, when the temperature is increased, the auricular vessels are often contracted for hours. From time to time, intermitting dilatations and contractions occur, in duration and degree apparently exceeding the rhythmical movements of the vessels of healthy rabbits. "Through these observations is, for

the first time, direct proof furnished that neither a paralysis nor a permanent tetanus of the vessels exists in the heat of fever.”

Hæmoglobin in Disease.—Quincke (*Virch. Arch.*, vol. 54; *Prag. Vierteljahrsschr.*, vol. 115) has found* the hæmoglobin of the blood to be diminished to a third in cases of chlorosis and leucæmia. In five cases of nephritis in all stages, it was considerably diminished. From the latter fact, he infers that in albuminuria, the blood corpuscles take part as well as the serum. In two cases of diabetes mellitus, there was no diminution. The same resulted in a slight case of scurvy, but in another, where repeated attacks of nasal hæmorrhage had occurred, the reverse was found. In typhoid, recurrent fever, and cerebro-spinal meningitis, he observed slight changes. In pyæmia, after three weeks’ duration, a notable diminution. In a case of phosphorus poisoning, despite a considerable disturbance of tissue metamorphosis, there was no change.

Jaundice.—At the meeting of the German Naturalists in 1872, Vogel speaks of the cause of icterus (*Allg. Med. Cent. Zeit.*, 1872, p. 877). He confirms Naunyn’s observation that bile acids occur in all urine, hence considers that this argument for a hæmatogenous jaundice falls to the ground. In the icterus said to follow the use of chloroform, he thinks that the influence of mental action is neglected, and in several instances a gastric catarrh is known to follow, which might readily give rise to the symptom. He also contends against the idea of a catarrhal origin, it being questionable whether the symptoms are not rather the result of interrupted bile-secretion than the cause. The occurrence of jaundice previous to the gastric symptoms favors this doubt. He knows of no experiments on animals where the bile-ducts have been simply irritated, not permanently closed. His remarks seem to favor more particularly the view of a nervous origin.

SPECIAL PATHOLOGICAL ANATOMY.

Diphtheritis.—Eberth (*Centrbl.*, 1873, No. 8) has satisfied himself that he can produce diphtheritis of the cornea of rabbits by inoculation with the diphtheritic membrane from the pharynx, endocardial deposits in malignant endocarditis, matter from the surface of diphtheritic wounds, the pus from inflamed veins in pyæmia, the fibrino-purulent exudation in puerperal peritonitis, and the blood from women dying in childbed with sepsis and diphtheria.

He concludes that the bacteria of putrefaction produce inflammation like the diphtheritic organisms, and that pyæmia is a diphtheria. A quantitative difference in the actions of diphtheritic and putrefactive bacteria renders it probable that these organisms are of a different species.

Senator (*Virch. Arch.*, v. 56, p. 56) finds the granular spores described by Buhl, Hüter and others, in the diphtheritic croup membrane from patients. In two cases, he observed them in the urine also, and agrees that they may be found in the tissues of the body. He argues that they are not characteristic of diphtheritis, as he finds the same in healthy mouths as well as in disease elsewhere. (Compare *infection* under general pathology.) He finds much stronger evidence in that fresh diphtheritic masses and bits of tissue from the air-pas-

* By means of the colorimetric method of Preyer.

sages (especially when the latter are primarily diseased, without resulting affection of the pharynx), do not contain these elements at all, or in a much less degree than in the pharyngeal forms. At the same time, he does not dispute the inoculability of the disease, but thinks the contagium must be sought in other directions.

The fungi may, however, be dangerous to the individual in that they enter the body, develop there, and produce destruction of the tissue, perhaps decomposition. They may become diphtheritic at the seat of the disease and thus carry the poison through the body, and, finally, produce embolism.

Hoof and Mouth Disease in Man.—Bircher (*Schweizer Correspbl.*, 1872, p. 123; *Schmidt's Jahrb.*, vol. 155, p. 37) has observed four cases where men became sick after partaking of milk from diseased animals. Chills and a burning sensation in the mouth occurred; the buccal mucous membrane secreted abundant mucus, and blisters formed upon it, of the size of peas, which ruptured and left ulcers. Violent diarrhoea occurred. In ten days, the disease terminated. He concludes that the hoof and mouth disease is acute and infectious, its chief symptoms depending upon a catarrhal inflammation of the digestive apparatus, and that the infectious material is contained in the secretions of the mouth and mammary glands.

Leucæmia.—Mosler makes a further contribution to the etiology of this disease (*Virch. Arch.*, v. 56, p. 14). He considers that this disease occurs among children under conditions previously unsuspected. Many cases of scrofula, rickets and tabes mesenterica are to be regarded as leucæmia. He narrates, briefly, a case where the disease is supposed to have resulted from scrofula, the splenic enlargement present only to a slight degree. He reports, also, a case of splenic leucæmia following intermittent fever. In 112 cases of the disease hitherto recorded by him, only four are found where the disease could certainly be regarded as following intermittent fever. In the present case, traumatic injury co-existed.

Tuberculosis.—The identity of the farcy (perlsucht) of the bovine genus with tuberculosis has been advocated for some time, and the experiments of Gerlach point very decidedly to the probability that the former disease may be transmitted to other animals by means of the milk of the diseased cow. The possibility of a similar inoculation of the human species must also be admitted, though the evidence hitherto has been mainly indirect. Schüppel (*Virch. Arch.*, v. 56, p. 38) claims the identity of structure of these two diseases. His examination of the small nodules to be found in the serous membranes, lungs and lymphatic glands of the diseased cattle convinces him that, as to size, structure, development and regressive metamorphosis, this identity must exist. He is also persuaded, by his histological investigations, that the tubercle is not a lymphatic new-formation, but is as independent in its structure as sarcoma or cancer.

ORGANS OF CIRCULATION.

Pericarditis.—Chapman (*Amer. Jour. of Med. Sciences*, Oct., 1872, and *Wien. Med. Jahrb.*, 1873) has been investigating the structural changes in this disease. He also gives his views with regard to the appearance of the normal endothelium. With reference to pathological alterations, he considers that all the cell-elements of the tissue

multiply. New formation takes place first of cells, then of connective tissue (false membrane), finally, most probably, of nerves, though this latter could not be established beyond a doubt. He did not sufficiently examine the condition of the bloodvessels to be justified in describing the part they may perform.

Embolism in Endocarditis.—The inaugural dissertation of Sperling is referred to (*Centrbl.*, 1872, p. 585), wherein statistics are tabulated from 300 cases examined at the Berlin Pathological Institute. In one case, the parietal endocardium was the sole seat of disease; in all the others the valves were diseased, with or without simultaneous affection of the parietal membrane. As to the disease of the individual valves:—

Alone.	In connection.
Tricuspid, 1 per cent.	10 per cent.
Pulmonary, 0 per cent.	1 per cent.
Mitral, 52 per cent.	85 per cent.
Aortic, 13 per cent.	43 per cent.

Frequently, many valves were simultaneously affected:—

All in 0·3 per cent. of all cases.
 All except pulmonary in 5·5 per cent. of all cases.
 Tricuspid and mitral in 3 per cent. of all cases.
 Pulmonary and mitral in 0·7 per cent. of all cases.
 Pulmonary and aortic in 0·3 per cent. of all cases.
 Mitral and aortic in 23·6 per cent. of all cases.

Twenty-nine per cent. of all the cases were complicated with embolism; originating on the right side in 2·3 per cent., on the left in 26 per cent. In the former series, the lungs were the sole seat of infarction and abscesses. Of the 76 cases forming the second series, the mitral valve was the source of the embolus in 88 per cent., while in 49 per cent. the aortic valves were diseased.

The emboli were carried to the

Kidneys in 75 per cent. of the cases.
 Spleen “ 5 “ “ “ “
 Brain “ 20 “ “ “ “
 Intestines and liver in 7 per cent. of the cases.
 Skin and liver in 5 per cent. of the cases.
 Bone-marrow in 3 “ “ “ “

Finally, to the thyroid gland and the inner membranes of the eye.

Gangrenous Endarteritis.—Van Lair (*Arch. d. Phys.*, 1872, p. 293) gives the result of his examination of the artery in such a case. Externally, the portion diseased was slightly blue, its elasticity diminished, the canal permeable. On cross section, a circular, dark-blue zone was observed, which was found to be limited to the outer portion of the intima. The discoloration resulted from the presence of clumps of brownish-blue granules, most abundant in the immediate vicinity of the middle coat. Towards the healthy tissue, an abundant cellular infiltration was observed. The pigment granules were regarded as directly derived from a necrotic metamorphosis of the cellular elements normal to the part.

Varicose Veins.—Cornil (*Arch. d. Phys.*, 1872, p. 602) makes a series of investigations with regard to this subject, and states that varix, distinguished from phlebectasia, a simple dilatation, “results from a chronic inflammation of the veins.” The alterations accompanied by

tissue development occur more particularly in the inner layer of the middle coat. The vasa vasorum become distended and extended. Secondly, the walls may become dilated and calcified. The secondary alterations are allied to those of chronic endarteritis, but differ in that the fatty and atheromatous changes were not observed.